

REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-5, 7, 9-23, and 25-28 are presently active in this case; Claims 19-22 and 26-28 previously withdrawn from consideration, and Claims 7 and 25 amended and Claims 6, 8, and 24 canceled by way of the present amendment.

In the outstanding Official Action, Claims 6 and 24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,193,663 to Napolitano et al.; and Claims 7, 8 and 25 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,617,863 to Starosta et al.; and Claims 1-5, 9-18 and 23 were allowed.

First, Applicants wish to thank Examiner Jung for allowance of Claims 1-5, 9-18 and 23.

With regard to the rejection of Claims 6 and 8, these claims have now been canceled. Therefore, the rejection is moot.

Turning now to the merits, Applicant's invention is directed to an improved ultrasound diagnostic apparatus for a contrast echo method using an ultrasound contrast agent mainly composed of microbubbles. As described in the Background of the Invention section of Applicant's specification, the invention provides an ultrasound scanning method and apparatus in consideration of the fact that the microbubbles in the contrast agent rapidly shrink and collapse upon reception of strong ultrasound waves. Specifically, Applicant's Claim 7 recites an ultrasound diagnostic apparatus including a transmission circuit configured to drive a probe to transmit an ultrasound wave while sequentially changing a direction of an ultrasound transmission line and drive the probe such that the ultrasound transmission lines are formed into a plurality of sets each constituted by a plurality of adjacent transmission lines. Also recited is that scanning is performed with respect to the plurality of sets on a forward direction and scanning is performed in a reverse direction within each of the sets.

Finally, Claim 7 has been amended to include canceled Claim 8's limitation that the transmission circuit sequentially switches a focus point position of an ultrasound wave to be transmitted in a scan sequence for obtaining a 1-frame ultrasound image at a long distance and short distance. Claim 25 has also been amended to include similar features in method claim format.

Thus, in order to expedite issuance of a patent in this case, Claim 7 and 25 have been amended to clarify that the pairs of scanning lines are sequentially scanned in the order of a first direction while two scanning lines in each pair are sequentially scanned in the order of a second direction opposite to the first direction, and that the focus point of the scanning lines is sequentially switched from a long distance to a short distance. This scanning sequence is exemplified in Fig. 7B and the text associated therewith of Applicant's specification. As described in Applicant's specification with reference to Fig. 7B, since the ultrasound scanning line are R2 is scanned first and scanned at a short distance focus point, the influence of this scanning on the ultrasound scanning line R1 is small. That is, microbubbles on the ultrasound scanning line R1 do not collapse as much as with prior art's scanning sequence. This scanning sequence provides uniformity to the contrast effect in the depth direction.

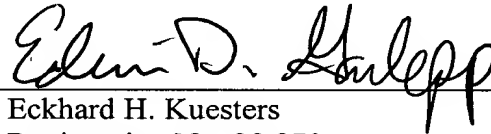
In contrast, the cited reference to Starosta et al. discloses a scanning technique that provides a reduction in multi-path reflection artifacts while maintaining a smoothly varying or uniform temporal disparity in the transmission times of adjacent beams. In the embodiment shown in Fig. 3 of Starosta et al., sequential scanning lines are alternated between scan lines 1, 3, . . . N-1 on the left side of a center line of the scan width, and scan lines 2, 4, . . . N on a right side of the center line. However, there is no discussion Starsota et al. of sequentially switching a focus point position at a long distance and short distance. In this regard, Applicant's note that, although the outstanding Official Action cites Starosta et al. to "anticipate all claimed features in [Claim 8]" the Official Action fails to address the feature

of sequentially switching the focus point. Thus, Applicants submit that Starosta et al. does not disclose the limitation of sequentially switching a focus point position of an ultrasound wave to be transmitted in a scan sequence for obtaining a 1-frame ultrasound image at a long distance and short distance as now claimed in Claim 7. Therefore, Claim 7 patentably defines over the cited reference to Starosta et al.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. An early and favorable action is therefore respectfully requested.

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